



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

GEOMETRY.

379. Proposed by G. I. HOPKINS, Manchester, N. H.

Construct the triangle, having given base, vertical angle, and ratio of its altitude to difference of other two sides.

Solution by A. H. HOLMES, Brunswick, Maine.

Describe a circle, center O , in which the chord AB (=given base) will subtend the given angle. Draw OD perpendicular to AB , and draw OB . With OD as a radius and O as a center, describe an arc cutting OB in E . Let the divisions MN and NP of the line MP represent the ratio of the difference of the sides of the triangle to the perpendicular. Construct the fourth proportional to MN , NP , and BE , and erect this line, BF , perpendicular to AB at the point B . Draw DF . With F as a center, and FB as a radius, describe an arc cutting FD in G . Find fourth proportional to MN , NP , and $2DG$. Erect this line, BH , perpendicular to AB at point B . Draw HC parallel to AB and cutting circumference in C . Draw AC and BC . Then ABC will be the required triangle, which is shown as follows: $AB=2a$; r , the radius, $=\frac{a}{\cos C}$. Put $x+y$ and $x-y$ for the sides, and p for the ratio of difference of sides to perpendicular. Then we have the proportion, $2r:x+y=x-y:2py$.

$$\therefore x^2 = y^2 + 2pry \dots (1).$$

$$\text{Also, } \cos C = \frac{(x+y)^2 + (x-y)^2 - 4a^2}{2(x+y)(x-y)}.$$

$$\therefore (1 - \cos C)x^2 + (1 + \cos C)y^2 = 2a^2 \dots (2).$$

Eliminating x^2 from (1) and (2), $y^2 + 2pr(1 - \cos C)y = a^2$.

$$\therefore y = [a^2 + p^2 r^2 (1 - \cos C)^2] - pr(1 - \cos C).$$

$$\therefore \text{Perpendicular } CK = 2py = 2p\{\sqrt{[a^2 + p^2 r^2 (1 - \cos C)^2]} - pr(1 - \cos C)\}.$$

Also solved by V. M. Spunar.

380. Proposed by W. J. GREENSTREET, A. M., Stroud, England.

$ABCD$ is a quadrilateral, sides in order a, b, c, d , and $B+D=\theta$. Express the diagonals in terms of a, b, c, d, θ .

Solution by A. H. HOLMES, Brunswick, Maine.

Let $ABCD$ be the rhombus, in which $AB=a, BC=b, CD=c, DA=d$. Put $x=AC, y=BD$, and $\angle ABC=\psi$. Then $\angle ADC=\theta-\psi$.

$$\text{In } \triangle ABC \text{ we have, } \cos \psi = \frac{a^2 + b^2 - x^2}{2ab}, \text{ and in } \triangle ADC, \cos(\theta - \psi) =$$

